

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>2012-105</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/CA 00/ 01292</b>	International filing date (day/month/year) <b>06/11/2000</b>	(Earliest) Priority Date (day/month/year) <b>08/11/1999</b>
Applicant  <b>FISHER, Harold</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/01292

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A61F5/01

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 188 356 A (FURR GUY H ET AL) 23 February 1993 (1993-02-23)	1, 3
A	column 4, line 23 -column 5, line 16; figures	2, 4-15
A	US 4 632 105 A (BARLOW CARL S) 30 December 1986 (1986-12-30) abstract; figures 1, 2, 10	1, 8, 15
A	US 4 709 694 A (O'CONNELL BONNIE) 1 December 1987 (1987-12-01) abstract; figure 3	1, 8
A	US 4 369 775 A (GAMM PAUL B) 25 January 1983 (1983-01-25)	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \* & \* document member of the same patent family

Date of the actual completion of the international search

22 March 2001

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5188356	A	23-02-1993	NONE	
US 4632105	A	30-12-1986	NONE	
US 4709694	A	01-12-1987	NONE	
US 4369775	A	25-01-1983	NONE	

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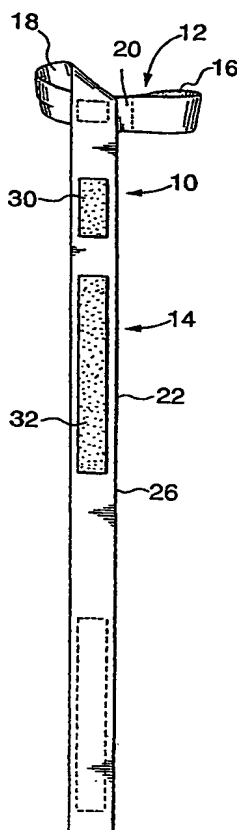
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[Continued on next page]

(54) Title: THUMB SPLINT



(57) Abstract: A thumb splint comprises a thumb receiving section for receiving a thumb of a user, an index finger receiving section for receiving an index finger of a user, a non-extendable, flexible connector extending between and secured to the thumb receiving section and the index finger receiving section for limiting abduction of the thumb to a predetermined value while permitting the thumb and index to move in a pinching action; and an elongated strap secured to the index finger receiving section for keeping the thumb and index finger receiving sections operatively positioned on the index finger and thumb, respectively.

WO 01/34070 A1



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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**THUMB SPLINT**

The present invention relates to a thumb splint for use in protecting and preventing injury to an injured or uninjured ulnar collateral ligament at the base of the thumb.

10 **Background of the Invention**

A sprain is a joint injury that causes a stretch or tear in a ligament, which is a strong band of tissue which connects one bone to another. A sprain of the ulnar collateral ligament in the thumb is a common injury in skiing and commonly referred to as "Skier's Thumb". It may occur when one falls onto an outstretched thumb, bending the thumb back toward the arm. This stretches and injures the ulnar collateral ligament. It may also be caused by a skier catching a thumb on a ski pole strap. The sprain may occur in other activities when one falls onto an outstretched thumb or when a thumb gets hooked onto another player's jersey or face mask. The injury results in pain, swelling, and tenderness at the inner part of the base of your thumb where the thumb attaches to the hand. The patient may find it difficult to hold an object in his hand and apply force with the thumb. Moving the thumb causes pain.

Treatment varies with the severity of the injury. Grade III sprain with a very loose joint requires surgery to repair the ligament. Grade I and II sprains may be treated with a cast, taping, or splinting so that the thumb does not move for up to six weeks.

25 The drawback of taping the thumb is that a relatively large amount of tape is required, the tape is relatively heavy and cumbersome and must be replaced relatively frequently, usually with assistance from another person.

Hand splint devices commonly used for the thumb typically utilize a rigid splint which secure the thumb in a fixed position by supporting the back side of the thumb and prevents any flexing of the thumb. Such rigid and fixed methods of support effectively completely immobilize the thumb. However, it is desirable to support the thumb in a manner which permits normal movement of the hand and full motion of the thumb, but prevents the hyper-extension of the thumb backwards. Prior art devices generally do not permit such full motion of the thumb. Further, prior art supports and splints generally obstruct the palm of the hand and thus render the hand movement substantially

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5       debilitated. Prior art also may require a glove or glove system to be worn rather than a simple unobtrusive fabric.

### **Summary of the Invention**

10       The present invention seeks to provide a thumb splint which protects the thumb while allowing substantially normal motion of the hand and thumb without rigid components or necessity to be used as part of a glove, and yet which is of low cost, lightweight, comfortable, easy to apply or remove, and easy to manufacture since it is made of one continuous ribbon of material folded and sewn/bonded.

15       The present invention is generally defined as a thumb splint comprising a thumb stabilizing component for securing the thumb of the user to the adjacent index finger permitting the thumb to move toward the index finger and leaving the digits free but limiting movement of the thumb away from the index finger to a predetermined angle; and a positioning component for securing the thumb stabilizing component in proper position on the hand of the user.

20       This unobtrusive and lightweight design will allow it to be used without a glove (e.g. basketball, tennis), or to fit under any other sports glove (e.g. skiing, hockey, baseball, etc.).

### **Brief Description of the Drawings**

25       These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings in which:

**Figure 1** is a plan view of a thumb splint in accordance with one embodiment of the present invention;

30       **Figure 2** is a plan view of a thumb splint illustrating the thumb stabilizing portion of the splint operatively positioned on the hand of a user;

**Figures 2, 3 and 4** are a plan views illustrating the various stages of the procedure of applying the positioning component of the splint is applied; and

**Figure 5** is a plan view of the back of the hand of a user showing the splint in its normal applied position.

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## Detailed Description of Preferred Embodiment of the Invention

**Figure 1** illustrates an embodiment of a thumb splint **10** of the present invention. The splint is generally comprised of a thumb stabilizing component **12** and a positioning component **14** for keeping the stabilizing component in proper position on the wearer's hand.

The stabilizing component **12** permits the thumb and index finger to move towards one another but precludes them from moving apart (abduct) beyond a predetermined angle. As best shown in **Figure 2**, the stabilizing component comprises a thumb receiving section **18**, an index finger receiving section **16** and a flexible, non-extendable, connector **20** which extends between and is secured to the thumb and finger receiving sections. The thumb receiving section **16** is arranged to engage a substantial portion of the side of the proximal phalanx bone of the thumb remote from the index finger. The index finger receiving section receives the index finger of the wearer and is positioned proximate the joint at which the index finger is connected to the hand, the carpometacarpal joint. The connector is flexible so as to permit the thumb and index finger to move towards one another in a pinching action, allowing the wearer to grip a ski pole or the like, and of a length which limits the thumb to move to a maximum angular distance with respect to the index finger in the order of about 90 to 100 degrees.

Both sections are formed to minimize the stresses applied to the thumb and index finger. This is achieved by forming the sections from relatively thin, wide straps which provide a relatively large skin engaging surface area. The connector may be made of any suitable material capable of absorbing forces applied to the thumb and index finger. Thus, the connector may be integral with the thumb and index finger receiving sections. Alternatively, the connector could be a separate element in the form of a narrow strip of material or a string or wire of suitable strength. In one embodiment of the invention, both sections and the connector are formed of thin, light weight material such as polyester or nylon webbing having a width of about 2.5 cm.

The positioning component serves to keep the thumb stabilizing component in proper position by drawing the stabilizing component toward the wrist of the wearer. In accordance with a preferred embodiment of the invention, the positioning component is comprised of an elongated strap **22**. One end **24** of the strap is secured to the stabilizing



5 component proximate the index finger receiving section. The other end 26 of the strap is releasably connectable to the stabilizing component or to the one end 24 of the strap. A preferred releasable connector comprises a pair of inter-engageable velcro strips 30 and 32. One of the velcro strips is secured to the one end 24 of the strap and the other strip is secured to the other end 26 of the strap. It will be understood that various other  
10 releasable connectors may be employed, including buttons, snaps, and the like.

The strap is of sufficient length so as to extend from the stabilizing component, along the palm of the hand, wrap around the wrist once, and then extend along the back side of the hand and releasably engage either the stabilizing component or the first end of strap. Preferably, the strap applies substantially equal forces to both sides the thumb and  
15 finger receiving sections so that both are kept firmly in position.

In a preferred embodiment of the invention, the splint is formed of a single strip of webbing material of uniform width of about 2.5 cm. The thumb receiving section is formed by folding one end of the strip onto itself and securing it to the strip by sewing. The index finger receiving section is formed a suitable distance from the thumb receiving  
20 section by again folding over the end of the strip such that the length of the web extends substantially transversely of the length of the webbing material and secured there by sewing. The portion of the web between the thumb and index finger receiving sections constitutes the connector. The balance of the length of webbing is the positioning strap.

To apply the splint, the user simply inserts his or her thumb and index finger into  
25 the thumb and index finger receiving sections, respectively, as shown in Figure 2. The index finger receiving section is fitted snugly against the metacarpophalangeal joint. The thumb receiving section is positioned so that its width extends along the side of the proximal phalanx remote from the index finger. The strap is then drawn downwardly toward the wrist over the palm of the hand, pulled around the back of the hand and wrist  
30 as shown in Figure 3, and then around the front of the wrist, and then pulled upwardly along the backside of the hand (Figure 4), between the thumb and index finger and secured by engaging the two velcro strips 30 and 32. The final applied configuration is shown in Figure 5.

The splint could be used alone or incorporated into the production of various types  
35 of gloves so that it would be in place when a skier pulls the gloves on. While primarily

5 designed for skiing, the thumb splint would also be appealing in other sports and activities where an unsupported thumb can be damaged easily.

It will be seen that the thumb splint of the present invention fulfills the need for a thin, light weight, splint that would prevent a skier from injuring his thumbs and that would be of low cost, comfort, and ease of application or removal.

10 The splint limits the abduction of the thumb to between 90 and 100 degrees, limits the extension of the thumb to between 90 and 100 degrees, and limits the posterior translation of the thumb. This would provide protection in the event of a fall so that the wearer is not injured.

15 For increased appeal, the thumb splint is light and thin so that it is comfortable to wear. The splint does not interfere with the wearer's ability to move his thumbs or fingers, and can still grip the handles of his ski poles. The straps could be worn by themselves or under a pair of gloves. The straps could also be incorporated into the production of a pair of liner gloves or a pair of waterproof, insulated outer gloves. It will also be seen that the splint is quick and easy to put on or take off, and is readily adjustable for a comfortable fit.

20 The straps would fit snugly, but would not restrict the flow of blood to the fingers or thumbs, and they would not cause the wearer's hands to sweat excessively.

25 Although the present invention has been described with reference to its preferred embodiments, those skilled in the art will recognize changes which may be made in form or structure which do not depart from the spirit of the invention already described in the specification and embodied in the claims which follow.

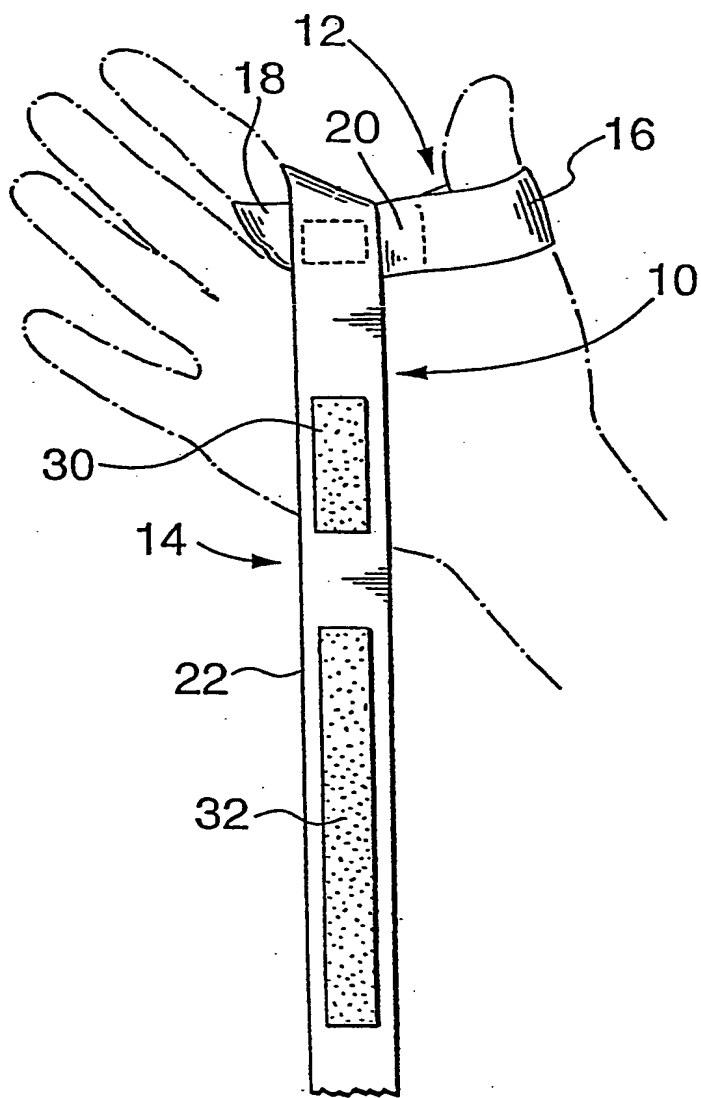
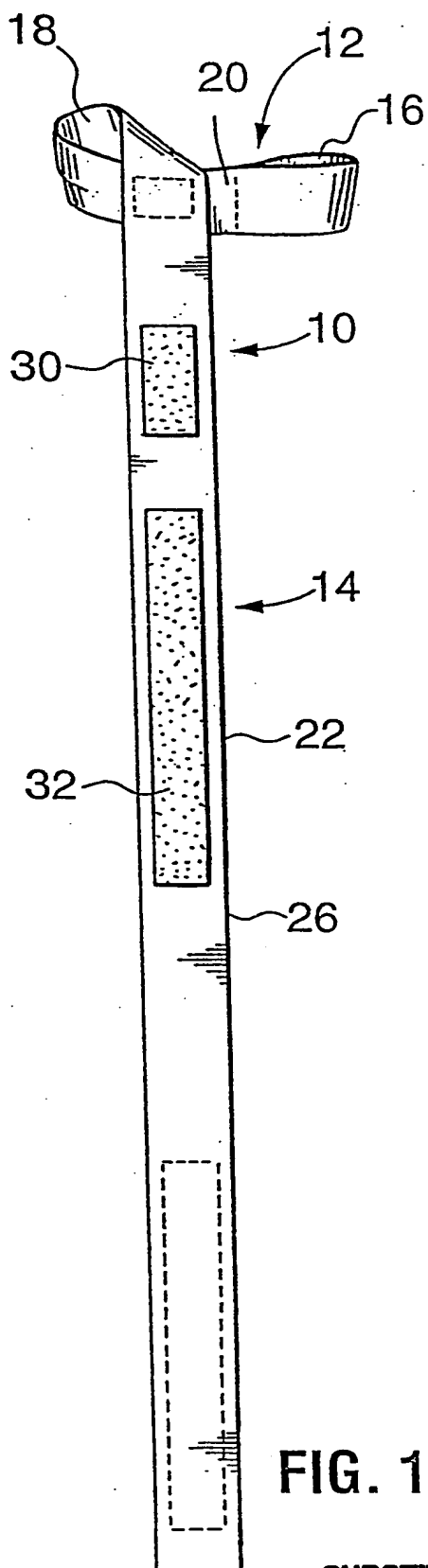
**I Claim:**

1. A thumb splint, comprising:
  - a thumb stabilizing component for securing the thumb of the user to the adjacent index finger permitting the thumb to move toward the index finger but limiting movement of the thumb away from the index finger to a predetermined angle; and
  - a positioning component for securing the thumb stabilizing component in proper position on the hand of the user.
2. A thumb splint as defined in claim 1, said thumb stabilizing component comprising:
  - a thumb receiving section for receiving a thumb of a user;
  - an index finger receiving section for receiving an index finger of a user;
  - a non-extendable, flexible connector extending between and secured to the thumb section and the index finger section for limiting abduction of the thumb to a predetermined value.
3. A thumb splint as defined in claim 1, said positioning component comprising an elongated strap having a first end secured to said thumb stabilizing component and a second end releasably securable to said one end of said strap or to said stabilizing component for keeping the stabilizing component operatively positioned on the hand of the user.
4. A thumb splint as defined in claim 2, said positioning component comprising an elongated strap having a first end secured to said thumb stabilizing component adjacent said index finger receiving section and a second end releasably securable to either said one end of said strap or to said stabilizing component for keeping the said thumb and index finger receiving sections operatively positioned on the hand of the user.

5. A thumb splint as defined in claim 4, said strap having a length sufficient to extend from said stabilizing component, along the palm of the hand of the user, to and around the wrist and along the backside of the hand.
6. A thumb splint as defined in claim 5, said thumb stabilizing component and said positioning component being integral and formed of a single length of polyester or nylon or other suitable fabric webbing.
7. A thumb splint as defined in claim 2, wherein said splint is incorporated into a glove or mitt.
8. A thumb splint, comprising:
  - a thumb receiving section for receiving a thumb of a user;
  - an index finger receiving section for receiving an index finger of a user;
  - a non-extendable, flexible connector extending between and secured to the thumb receiving section and the index finger receiving section for limiting abduction of the thumb to a predetermined value; and
  - an elongated strap secured to the index finger receiving section for keeping the thumb and index finger receiving sections operatively positioned on the index finger and thumb, respectively.
9. The splint as claimed in claim 8, wherein said splint are made from one continuous thin and light weight ribbon of material.
10. The splint as claimed in claim 9, wherein said material is polyester or nylon or other suitable webbing.
11. The splint as claimed in claim 8, said thumb receiving section having a surface for engaging a substantial portion of the distal side, relative to the index finger, of the proximal phalange of the thumb.

12. The splint as claimed in claim 8, wherein said index finger receiving section fits around the base of the proximal phalange of the index finger.
13. The splint as claimed in claim 8, wherein said connector is of a length that the thumb can move and extend back freely, but not hyper-extend or abduct the thumb away from the base of the index finger beyond 100 degrees to a position where a wearer could injure the thumb.
14. The splint as claimed in claim 8, wherein said securing strap attached to the index finger receiving section at the point where said index finger receiving section connects with the connector to hold the receiving sections down on the fingers, wrapped across the hand and the wrist to secure said splint.
15. A thumb splint, comprising:  
one continuous thin and light weight ribbon of polyester or nylon material formed to define:  
a thumb receiving section for receiving a thumb of a user, said thumb receiving section having a surface for engaging a substantial portion of the distal side, relative to the index finger, of the proximal phalange of the thumb;  
an index finger receiving section for receiving an index finger of a user, said index finger receiving section fits around the base of the proximal phalange of the index finger;  
a non-extendable, flexible connector extending between and secured to the thumb receiving section and the index finger receiving section for limiting abduction of the thumb to a predetermined value, said connector is of a length that the thumb can move and extend back freely, but not hyper-extend or abduct the thumb away from the base of the index finger beyond 100 degrees to a position where a wearer could injure the thumb;  
and  
an elongated strap secured to the index finger receiving section for keeping the thumb and index finger receiving sections operatively positioned on the index finger and thumb, respectively; said securing strap being attached to the index finger receiving section at the point where said index finger receiving section connects with the connector

to hold the receiving sections down on the fingers, wrapped across the hand and the wrist to secure said splint.



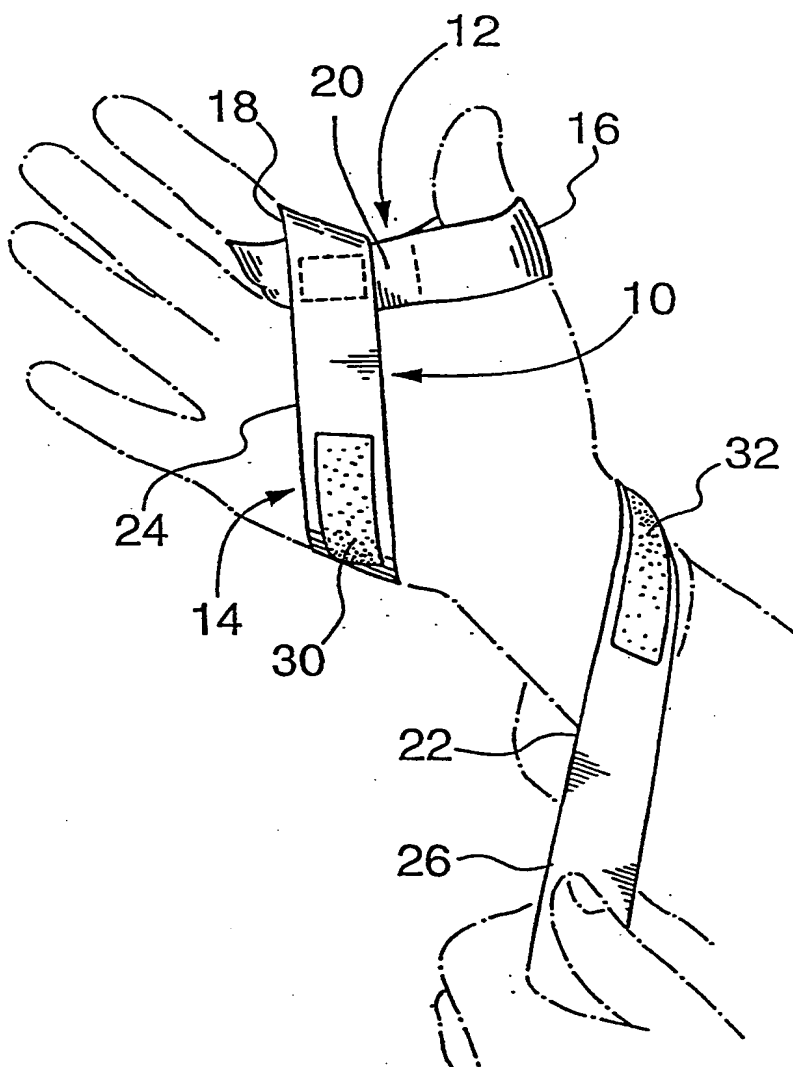


FIG. 3



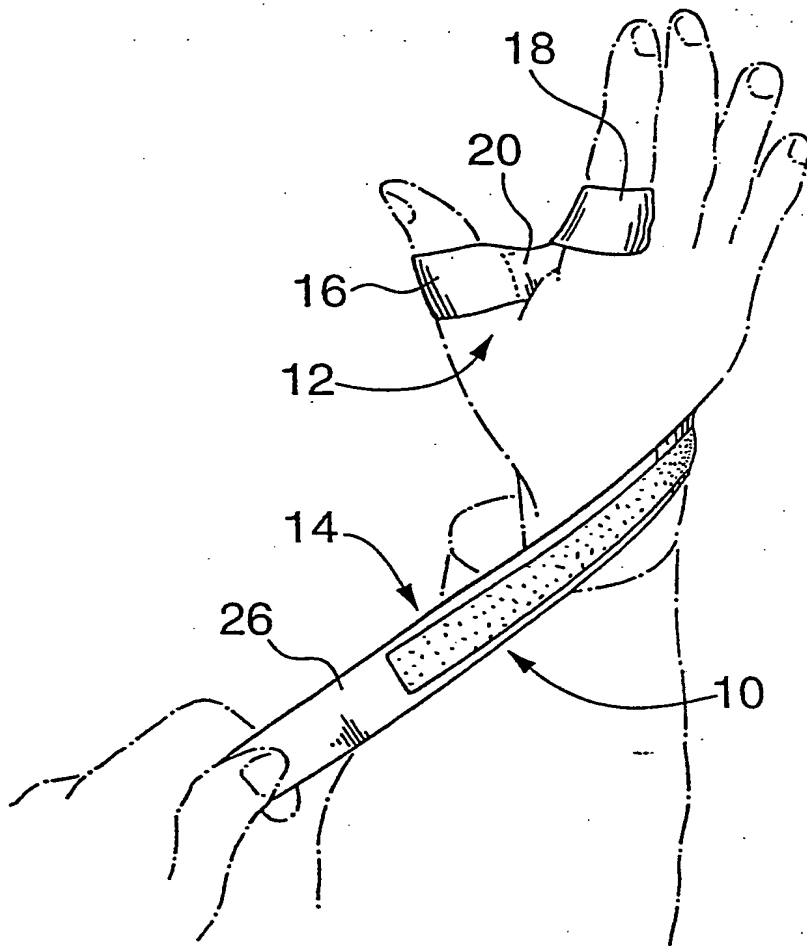


FIG. 4

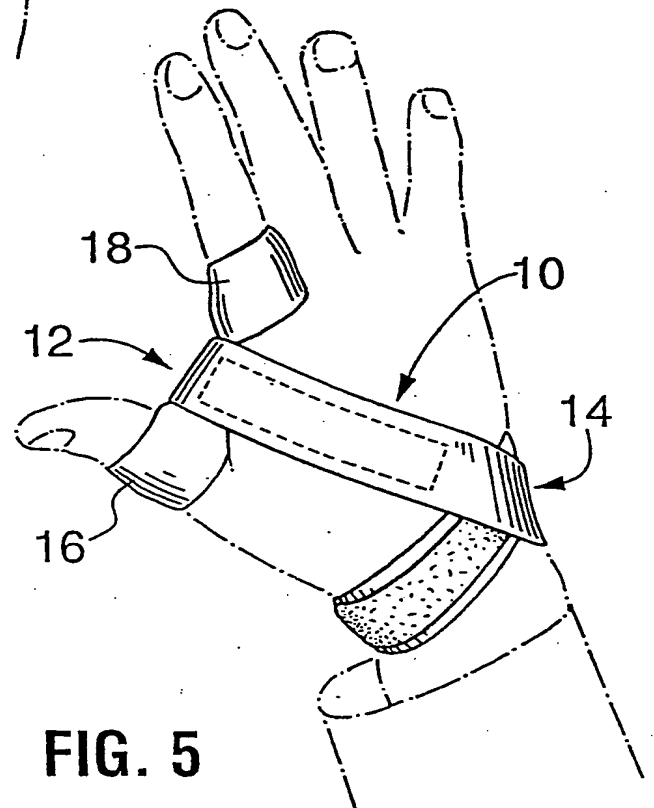


FIG. 5